

DETAILED ACTION

1. This communication is in response to the Appeal Brief filed on 28 September 2009.
2. Claims 1, 3-5, 7-10, 13, 15-19 and 25-29 are currently pending. As a result of the Appeal Brief filed 28 September 2009 and the Examiner's Amendment stated below, claims 1, 3-5, 7-10, 13, 15-19 and 25-29 (renumbered as 1-19) are allowed and claims 2, 6, 11, 12, 14 and 20-24 are canceled.

Examiner Amendment

3. Authorization for this examiner's amendment, listed below, was given in a telephone interview with Scott Stinebruner (Reg. No. 38,323) on 16 December 2009.

In the Claims:

Please amend claims 1, 10, 13 and 25-29 as follows:

1. (Currently Amended) A method for optimizing a database query in a computer of the type including a database management system, the database query including criteria that references a plurality of tables in order to re-order a result set generated for the database query, ~~wherein the criteria is one of a GROUP BY clause and an ORDER BY clause~~, the method comprising the steps of, in the computer:

applying transitive closure analysis to at least one search condition in the query to identify an equivalent field for a field referenced in the criteria, wherein the criteria is one of a GROUP BY clause and an ORDER BY clause; and

based on the transitive closure analysis, rewriting the criteria to generate modified criteria to reduce the number of tables referenced thereby by substituting the equivalent field for the field referenced in the criteria, including rewriting the criteria to generate modified criteria that references only one table, based on the transitive closure analysis.

10. (Currently Amended) A method of optimizing a database query in a computer of the type including a database management system, the database query including criteria that operates to re-order a result set of the database query and requires creating a temporary file during operation, ~~wherein the criteria is one of a GROUP BY clause and an ORDER BY clause~~, the method comprising the steps of, in the computer:

applying transitive closure analysis to at least one search condition in the query to identify an equivalent field for a field referenced in the criteria, wherein the criteria is one of a GROUP BY clause and an ORDER BY clause; and
rewriting the criteria, based on the transitive closure analysis, to generate a modified criteria by substituting the equivalent field for the field referenced in the criteria, wherein the criteria references a plurality of tables and the modified criteria references a single table; said modified criteria operating to re-order a result set of the database query and avoid creating a temporary file during operation.

13. (Currently Amended) A method for optimizing a database query in a computer of the type including a database management system, the database query involving a plurality of join operations and a plurality of search conditions, the method comprising the steps of, in the computer:

applying transitive closure analysis to the plurality of search conditions in the query to determine a subset of equivalent search fields;

rewriting a criteria, that operates to re-order a result set of the database query, to generate a set of respective modified criteria that each reference one or more equivalent search fields, wherein the criteria is one of a GROUP BY clause and an ORDER BY clause;

identifying a subset of the respective modified criteria that reference a single, respective table; and

selecting a join order from among a plurality of join orders for the plurality of join operations, including analyzing join orders using at least one of the set of respective modified criteria.

25. (Currently Amended) A program product, comprising:
program code configured upon execution thereof to:

apply transitive closure analysis to at least one search condition in a query that includes criteria that references a plurality of tables in order to re-order a result set generated for the query, and based on the transitive closure analysis, rewrite the criteria to generate modified criteria to reduce the number of tables

referenced thereby, wherein the criteria is one of a GROUP BY clause and an ORDER BY clause, wherein the program code is configured to apply transitive closure analysis to identify from the at least one search condition an equivalent field for a field referenced in the criteria, ~~and~~ wherein the program code is configured to rewrite the criteria by substituting the equivalent field for the field referenced in the criteria, and wherein the modified criteria references only one table; and

a recordable computer readable medium storing the program code.

26. (Currently Amended) The program product of claim 25 [[24]], wherein the program code is further configured to:

run the query according to a join order that is based on the modified criteria.

27. (Currently Amended) A program product, comprising:
program code configured upon execution to:

apply transitive closure analysis to a plurality of search conditions to determine a subset of equivalent search fields within a database query involving a plurality of join operations and the plurality of search conditions, rewrite a criteria, that operates to re-order a result set of the database query, to generate a set of respective modified criteria that each reference one or more equivalent search fields, and select a join order from among a plurality of join orders for the plurality of join operations by analyzing join orders using at least one of the set of

respective modified criteria, wherein the criteria is one of a GROUP BY clause and an ORDER BY clause, and wherein the program code is further configured to identify a subset of the respective modified criteria that reference a single, respective table; and

a recordable computer readable medium storing the program code.

28. (Currently Amended) The program product of claim [[22]] 27, further configured to:

run the database query according to a join order, the join ordered determined by selecting one of the set of respective modified criteria.

29. (Currently Amended) An apparatus, comprising:

at least one processor;

a memory coupled with the at least one processor; and

a program code residing in memory and executed by the at least one processor, the program code configured to apply transitive closure analysis to at least one search condition in a query that includes criteria that references a plurality of tables in order to re-order a result set generated for the query, and based on the transitive closure analysis, rewrite the criteria to generate modified criteria to reduce the number of tables referenced thereby, wherein the criteria is one of a GROUP BY clause and an ORDER BY clause, wherein the program code is configured to apply transitive closure analysis to identify from the at least

one search condition an equivalent field for a field referenced in the criteria, [[and]] wherein the program code is configured to rewrite the criteria by substituting the equivalent field for the field referenced in the criteria, and wherein the modified criteria references only one table.

Reasons for Allowance

4. The following is an examiner's statement of reasons for allowance:

In the Examiner's Final Office Action dated 27 April 2009, claims 1, 3-5, 9, 10, 13, 15, 18, 19 and 25-29 were rejected under 35 USC 103 based primarily on US Patent No 6,757,677 to Pham et al; the background of US Patent No 6,662,175 to Ghazal et al; and "The Bulletin of the Technical Committee on Data Engineering."

The claimed invention is directed towards applying transitive closure analysis to a search condition in a query, wherein the search query contains a Group By or Order By clause. Based on the transitive closure analysis of the query, the Group By or Order by clause is then rewritten in a manner in which the clause references a single table.

The prior art of record, do not show, teach or suggest the combined limitations of **applying transitive closure analysis to at least one search condition in the query to identify an equivalent field for a field referenced in the criteria, wherein the criteria is one of a GROUP BY clause and an ORDER BY clause; and based on the transitive closure analysis, rewriting the criteria to generate modified criteria to reduce the number of tables referenced thereby by substituting the equivalent field for the field referenced in the criteria, including rewriting the criteria to**

generate modified criteria that references only one table, based on the transitive closure analysis in combination with the other claimed features.

Pham discloses a query that includes a group by clause, including the concept of taking the group by clause into consideration when optimizing the join. Ghazal discloses the concept of applying transitive closure to a query. The Data Engineering article also discloses the concept of transitive closure. However, none of the prior art of record discloses the concept of applying the results of the transitive closure to a group by or order by clause in order to rewrite the group by or order by clause to reference a single table.

An updated search for prior art on the EAST database and on domains (NPL-Google and ACM) has been conducted. The prior art searched and investigated in the database and domains does not fairly teach or suggest the teaching of the claimed subject matter as described above and reflected by the combined elements in independent claims 1, 10, 13, 25, 27 and 29. Dependent claims 3-5, 7-9, 15-19, 26 and 28 are indicated as being allowable for the same reasons stated above in regards to the independent claims.

5. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KIMBERLY LOVEL whose telephone number is (571)272-2750. The examiner can normally be reached on 8:00 - 4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Cottingham can be reached on (571) 272-7079. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/John R. Cottingham/
Supervisory Patent Examiner, Art Unit 2167

/Kimberly Lovel/
Examiner
Art Unit 2167

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